

## Response of Solar Updraft Power Plants Incorporating Material Nonlinearity

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**Abstract :** Solar updraft power plants (SUPP) provide a great potential for green and environmentally friendly renewable power generation. An up to 1000 m high chimney represents one of the major parts of each SUPP, which consist of the main shell structure and the stiffening rings. Including the nonlinear material behavior in a simulation of the chimney is computationally a demanding task. However, allowing the formation of cracking in concrete leads to a more economical design of the structure. In this work, an FE model of a SUPP is presented incorporating the nonlinear material behavior. The effect of wind loading intensity on the structural response is explored. Furthermore, the influence of the stiffness of the ring beams on the global behavior is as well investigated. The obtained results indicate that the minimum reinforcement is capable of carrying the tensile stresses provided that the ring beams are rather stiff.

**Keywords :** ABAQUS, nonlinear analysis, ring beams, SUPP

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